



TEC/PC3 INSTALLATION PROCEDURE

procedure name

PHENIX Procedure No. PP-2.5.5.4-06

Revision: A

Date: 4-21-99

Hand Processed Changes

<u>HPC No.</u>	<u>Date</u>	<u>Para.</u> <u>Page Nos.</u>	<u>Initials</u>
<u>1</u>	<u>9/21/99</u>	<u>1.1, 5.1, 7.1.5, 7.1.6</u> <u>7.2.2, 7.3.2, 7.4.2, 7.4.3</u> <u>7.4.4</u>	<u>PAK, 5013</u>
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Approvals

PHENIX S E & I 5/9/99
Date

6015 9/22/99
5/16/99
Cognizant Scientist/Engineer. Date
/Activity Manager

PHENIX QA/Safety 6/21/99
Date

1/14/99 6/23/99
RHIC ES&H Date

PHENIX Procedure # PP-2.5.5.4-06 Rev A

REVISION CONTROL SHEET

LETTER	DESCRIPTION	DATE	WRITTEN BY	APPROVED BY	CURRENT OVERSIGHT
A	First Issue	4/21/1999	n/a	E. O'Brien, W. Lenz, (2 unintelligible)	n/a
RETIRED	Installation completed	3/19/2007	n/a	D. Lynch, P. Giannotti, R. Pisani for PHENIX	D.Lynch

1.0 Purpose and Scope

- 1.1 The purpose of this procedure is to provide direction for rigging the four TEC/PC3 sectors onto the East carriage in Building 1008. Each sector is rigged separately onto the carriage with different procedures.

Note that each TEC/PC3 sector weighs ¹⁸⁶⁰~~1400~~ lbs.

2.0 Responsibilities

- 2.1 All operations shall be performed under the direction of the PHENIX Experimental Hall "Person-in -Charge" or his designee.
- 2.2 Due to the delicacy of the interior detector components and their value, as well as the inherent personnel risk involved in handling such large objects, this procedure and all relevant BNL safety guidelines must be strictly adhered to. In accordance with BNL policy , any individual may cease operations if they feel unsafe or if they believe unsafe procedures are being followed. Such a complaint shall be reviewed by the cognizant engineer, and if necessary, BNL ES&H services.

3.0 Prerequisites

- 3.1 Training: All personnel involved in this procedure shall have reviewed this procedure, and be fully knowledgeable about the way in which the TEC/PC3 sectors mount to the carriage. All personnel shall sign acknowledgement sheets to that affect.
- 3.2 All personnel involved in this procedure must have current BNL Safety Training required to do work in the PHENIX PEH including GET, Hazcom, Rad Worker 1, Stop Work and GE Emergplan. The crane operator must have current BNL Crane Operation Safety Training.
- 3.3 All personnel involved in this procedure shall wear hardhats in accordance with RHIC SEAPPM 1.16.0.
- 3.4 Personnel involved in this procedure shall wear safety shoes.

4.0 Precautions

- 4.1 Visitors shall not be permitted in the PEH during these procedures.
- 4.2 The area where rigging operations will be performed shall be cordoned-off to all personnel except for the Person-in-Charge and the technicians assigned to perform the procedure.
- 4.3 Some operations will require personnel to work in close proximity to suspended loads. Do not permit anyone to be positioned under the load.

5.0 Equipment List

- 5.1 The following equipment & hardware is called for in various sections of this procedure:

30-ton lift beam (1) S/N 92724, Model # 20S-80-14

Swivel eyes: 3/8-16 Swivel eyes (4), 1000 lbs. capacity; *3/4-10 Swivel eyes (2), 5000 lb capacity.*

Slings: 3 ton capacity(2)

TEC 2 ton H lifting fixture (1) S/N 02208, Model # 25S-2-80, Test SE302099

Wire Rope Turnbuckle Assembly Drawing 002-0206-1018 (2)

Chain Fall 3 ton capacity(2)

4"x4"x 7' wood blocks(2)

Note: All 1"-8 bolts torque to 150 ft-lbs.

All 3/4"-10 bolts torque to 100 ft-lbs.

All 3/8"-16 bolts torque to 20 ft-lbs.

6.0 Preparation

- 6.1 Sector Mounts 002-0206-989, 990 shall have been previously surveyed to their correct positions in accordance with PHENIX dwg. 002-0206-1019.

- 6.2 Attach carriage center bracket right/left (002-0206-1010, 1012)

carriage top bracket right/left (002-0206-1016, 1017)
to the East carriage.

6.3 Bolt but do not tighten TEC carriage attachment angle (002-0206-1013,1014)
to carriage.

7.0 Procedure

7.1 Sector E0

- 7.1.1 Position TEC Sector E0 in PHENIX Assembly Hall on TEC cart under 40 ton crane hook.
- 7.1.2 Attach Swivel eyes to TEC sector plates (002-0206-993,994,1006,1007) Position H.
- 7.1.3 Attach 40 ton crane hook to TEC 2-ton lifting fixture and slings from the lifting fixture to the swivel shackles on the TEC sector plates. Configure for a horizontal lift.
- 7.1.4 Lift TEC sector off of the cart and onto floor in 1008 resting the bottom of sector plates (002-0206-993,994,1006,1007) on 4" x 4"s.
- 7.1.5 Remove the weight from the crane. Disconnect the slings. Take the TEC 2 ton lifting fixture off the crane hook. Remove swivel shackles from sector plates ~~002-0206-993,994~~. *eyes*

Note: Lifts of sectors E1, E2 and E3 should follow steps 7.1.1-7.1.5 when removing each sector from TEC cart. For sectors E1,E2 and E3 sector plates 002-0206-993,994 are replaced by sector plates 002-0206-995,996.

- 7.1.6 *Attach eyes to* Move swivel shackles in sector plates 002-0206-1006,1007 *using the inner 3/4"-10 mounting holes nearest* to position A.
- 7.1.7 Attach the yellow 30 ton lift beam to the sector using 40 ton crane hook and the slings to be configured for a vertical lift.
- 7.1.8 Slowly lift the TEC sector off the floor moving it from a horizontal to a vertical position. The sector should be rotating on the bottom of sector plates 002-0206-993,994. Block the back part of the sector plates to shift the pivot point back before the CG goes over. **Caution: Watch-out for kickout of 4"x4" 's.**
- 7.1.9 Move the sector to the East carriage. Place the bottom of the Aluminum Sector plates 002-0206-993 and 002-0206-994 on Sector mounts 002-0206-989 and 002-0206-990 respectively.
- 7.1.10 Bolt 002-0206-993 to 002-0206-989 and 002-0206-994 to 002-0206-990. Tighten all bolts.
- 7.1.11 Remove the weight from the crane. Disconnect the slings and remove the swivel eyes from 002-0206-1006,1007.

- 7.1.12 Survey sector E0 in place. Adjust mounts 002-0206-989,990 bringing E0 to its proper angle and position.
- 7.1.13 Attach two wire-rope turnbuckles 002-0206-1018 between Sector mounts 989,990 and Sector plates 1006,1007. Adjust turnbuckles so that they are under tension, but not so much that the sector changes its position. See Figure 4.

7.2 Sector E1

- 7.2.1 Position TEC Sector E1 in PHENIX Assembly Hall on TEC cart under 40 ton crane hook and follow steps 7.1.1-7.1.5 in removing the sector from the TEC cart.
- 7.2.2 ^{Attach eyes to} Move swivel shackles in sector plates 002-0206-1006,1007 ^{using The inner 3/4" mounting holes nearest} to position D.
- 7.2.3 Attach the yellow 30 ton lift beam to the sector using 40 ton crane hook and the slings to be configured for a vertical lift.
- 7.2.4 Slowly lift the TEC sector off the floor moving it from a horizontal to a vertical position. The sector should be rotating on the bottom of sector plates 002-0206-995,996. Block the back part of the sector plates to shift the pivot point back before the CG goes over. **Caution: Watch-out for kickout of 4"x4" 's.**
- 7.2.5 Move the sector to the East carriage. Place the bottom of the Aluminum E1 Sector plates 002-0206-995,996 on top of E0 Sector plates 002-0206-1006,1007.
- 7.2.6 Bolt Sector E1 plates 002-0206-995 to Sector E0 plates 002-0206-1006 and 002-0206-996 to 002-0206-1007.
- 7.2.7 Bolt Sector E1 plates 002-0206-1006,1007 to carriage attachment angles 002-0206-1013,1014.
- 7.2.8 Take weight slightly off the crane. Tighten all bolts.
- 7.2.9 Survey with crane weight off but slings still on. Survey sector E1 in place. Adjust mounts 002-0206-989,990 and carriage attachment angles 0002-0206-1013,1014 bringing E0 and E1 to proper position and angle.
- 7.2.10 Completely remove weight from crane. Disconnect the slings and remove the swivel eyes from 002-0206-1006,1007.

7.3 Sector E2

- 7.3.1 Position TEC Sector E2 in PHENIX Assembly Hall on TEC cart under 40 ton crane hook and follow steps 7.1.1 - 7.1.5 in removing the sector from the TEC cart.
- 7.3.2 ^{Attach eyes to} Move swivel shackles in sector plates 002-0206-1006,1007 ^{using The inner 3/4" mounting holes nearest} to position H.
- 7.3.3 Attach the yellow 30 ton lift beam to the sector using 40 ton crane hook and the slings to be configured for a vertical lift.

- 7.3.4 Slowly lift the TEC sector off the floor moving it from a horizontal to a vertical position. The sector should be rotating on the bottom of sector plates 002-0206-995,996. Block the back part of the sector plates to shift the pivot point back before the CG goes over. **Caution: Watch-out for kickout of 4"x4" 's.**
- 7.3.5 Move the sector to the East carriage. Place the bottom of the Aluminum E2 Sector plates 002-0206-995,996 on top of E1 Sector plates 002-0206-1006,1007.
- 7.3.6 Bolt Sector E2 plates 002-0206-995 to Sector E1 plates 002-0206-1006 and 002-0206-996 to 002-0206-1007.
- 7.3.7 Bolt Sector E2 plates 002-0206-1006,1007 to carriage attachment angles 002-0206-1013,1014.
- 7.3.8 Take weight slightly off the crane. Tighten all bolts.
- 7.3.9 Survey with crane weight off but slings still on. Survey sector E2 in place. Adjust carriage attachment angles 002-0206-1013,1014 bringing E2 to proper position and angle.
- 7.3.10 Completely remove weight from crane. Disconnect the slings and remove the swivel eyes from 002-0206-1006,1007.

7.4 Sector E3

- 7.4.1 Attach chain falls to the inner arms of the East Carriage. Each chain fall is mounted to the inside of carriage, one on each arm, vertically aligned with the final position of bottom of Sector E3.
- 7.4.2 Position TEC Sector E3 in PHENIX Assembly Hall on TEC cart under 40 ton crane hook and follow steps 7.1.1 - ~~7.1.5~~ in removing the sector from the TEC cart. *7.1.4*
- 7.4.3 Remove the weight from the crane. Disconnect the slings. Take the TEC 2 ton lifting fixture off the crane hook. DO NOT Remove swivel ~~shackles~~ *eyes* from sector plates, ~~002-0206-995,996~~.
- 7.4.4 ~~Move swivel shackles in sector plates 002-0206-1006,1007 to position H.~~ *[This step not required]*
- 7.4.5 Attach the yellow 30 ton lift beam to the sector using 40 ton crane hook and the slings to be configured for a vertical lift.
- 7.4.6 Slowly lift the TEC sector off the floor moving it from a horizontal to a vertical position. The sector should be rotating on the bottom of sector plates 002-0206-995,996. Block the back part of the sector plates to shift the pivot point back before the CG goes over. **Caution: Watch-out for kickout of 4"x4" 's.**
- 7.4.7 Move the sector to the East carriage. Place the bottom of the Aluminum E3 Sector plates 002-0206-995,996 a few inches above the vertical position

- of the top of E2 Sector plates 002-0206-1006,1007.
- 7.4.8 Attach the chain falls to the swivel shackles in the H position of E3 Sector plates 002-0206-995,996.
 - 7.4.9 Adjust the chain falls until Sector E3 is at the proper angle and positioned slightly above Sector E2.
 - 7.4.10 Lower Sector E3 until the Sector E3 bottom plates 002-0206-995,996 contact the top of Sector E2 plates 002-0206-1006,1007. Bolt Sector E3 plates 002-0206-995 to Sector E2 plates 002-0206-1006 and 002-0206-996 to 002-0206-1007.
 - 7.4.11 Bolt Sector E3 plates 002-0206-1006,1007 to carriage attachment angles 002-0206-1013,1014.
 - 7.4.12 Take weight slightly off the crane. Take the weight slightly off the chain falls. Tighten all bolts.
 - 7.4.13 Survey with crane weight off but slings still on. Survey sector E3 in place. Adjust carriage attachment angles 002-0206-1013,1014 bringing E3 to proper position and angle.
 - 7.4.14 Completely remove weight from crane and the chain falls. Disconnect the chain falls. Disconnect the slings and remove the swivel eyes from 002-0206-995,996,1006,1007.
 - 7.4.15 Remove wire rope-turnbuckles 002-0206-1018.

Figure 2

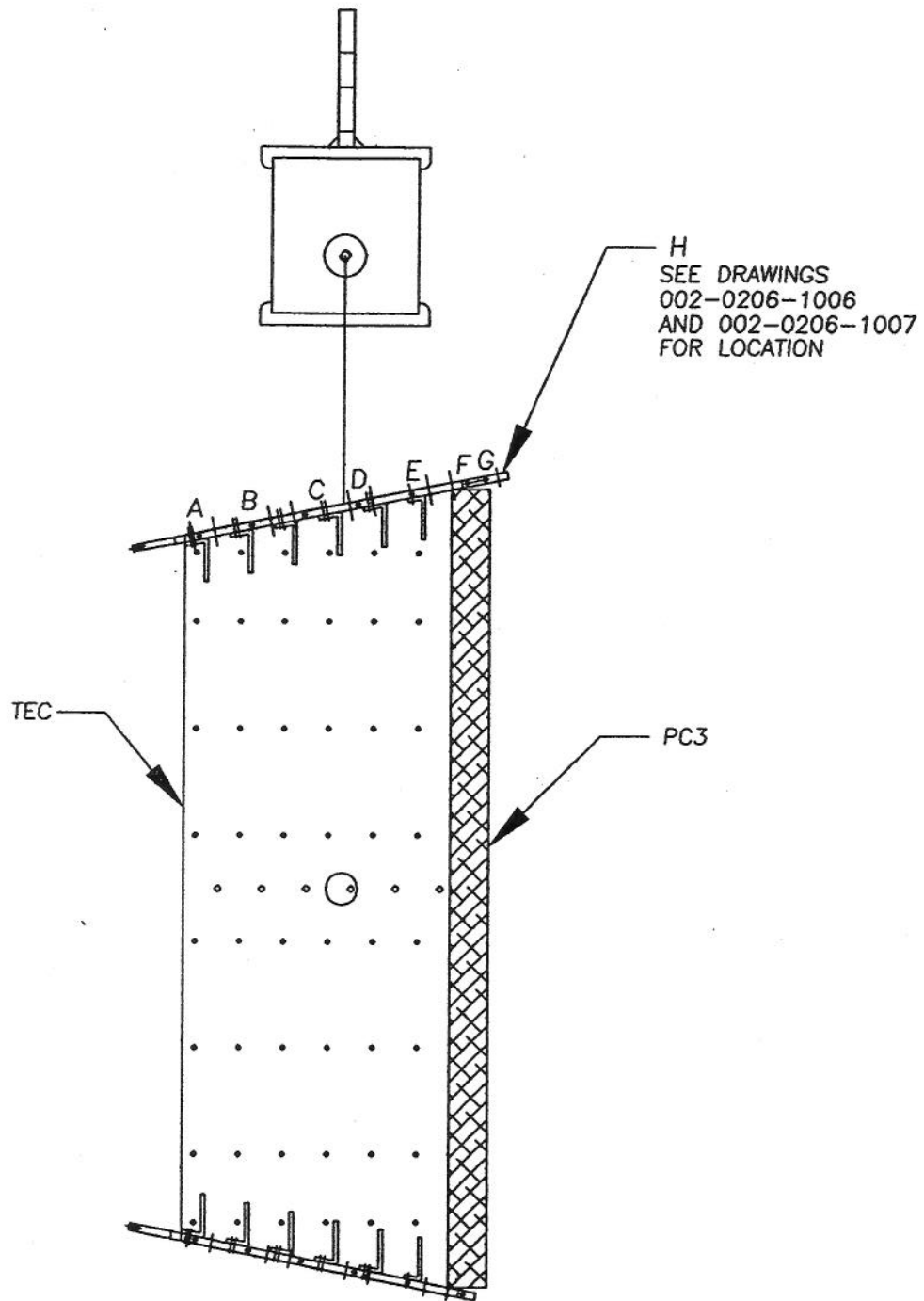
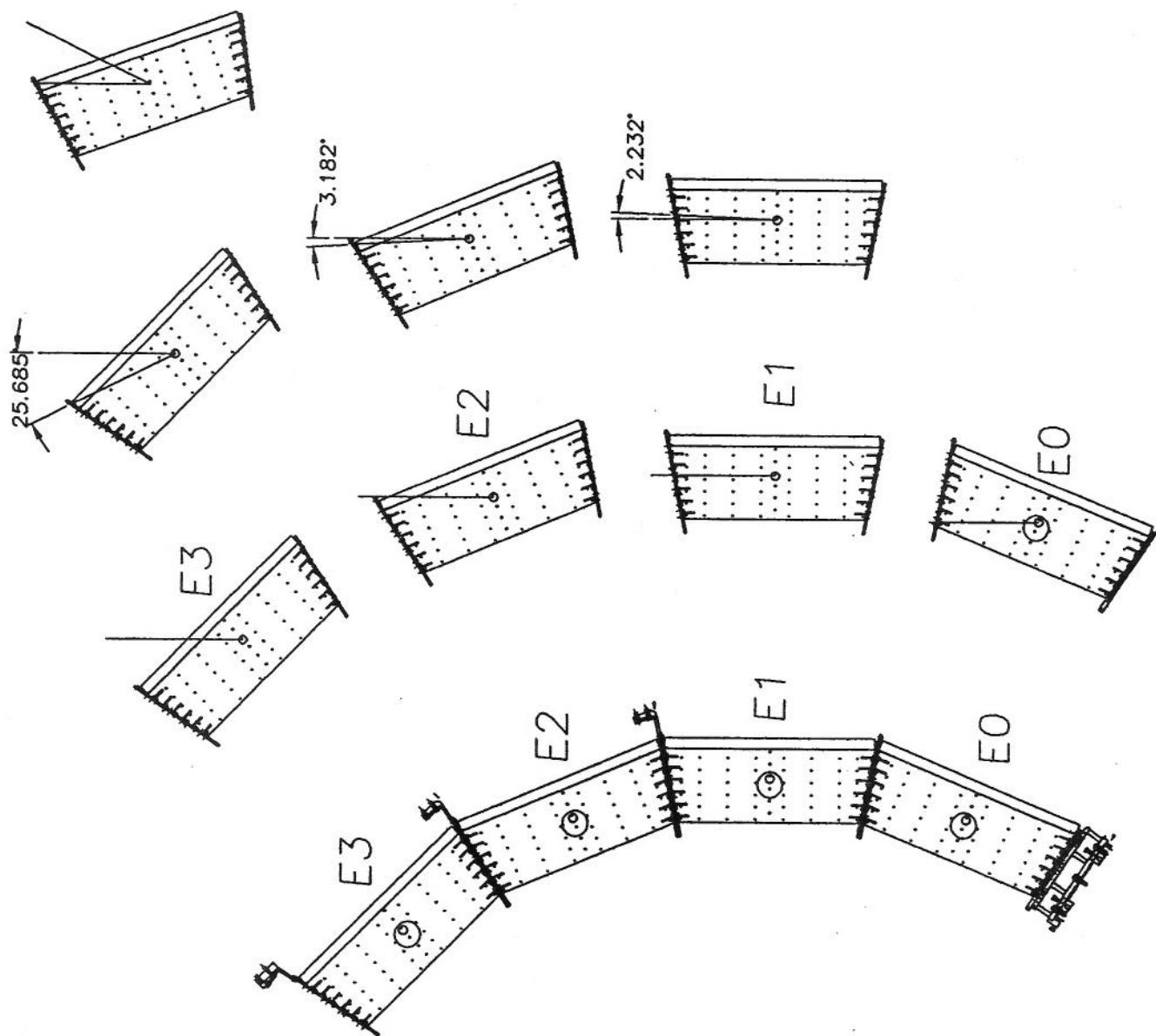


Fig e3



Technical drawing of a crane hook assembly, showing two views: View A-A and View B-B.

View A-A (Side Elevation):

- Labels include: TED UPPER CAPSULE SUPPORT PLATE, WIRE ROPE, TED UPPER WIRE ROPE EYE DAI, WIRE ROPE TURNBUCKLE, TED CAPSULE SUPPORT PLATE, TED CAPSULE ALIGNMENT BRACKET, LOWER WIRE ROPE EYE DAI, TED CAPSULE ALIGNMENT BRACKET, BOLT HOLES FOR LIFTING BRACE, TED SIDE PLATE, P02, P03, CARDS AND, LOWER WIRE ROPE EYE DAI, TED CAPSULE SUPPORT PLATE, TED CAPSULE ALIGNMENT BRACKET.

View B-B (Cross Section):

- Labels include: TED UPPER CAPSULE SUPPORT PLATE, WIRE ROPE, TED UPPER WIRE ROPE EYE DAI, WIRE ROPE TURNBUCKLE, TED CAPSULE SUPPORT PLATE, TED CAPSULE ALIGNMENT BRACKET, LOWER WIRE ROPE EYE DAI, TED CAPSULE ALIGNMENT BRACKET, BOLT HOLES FOR LIFTING BRACE, TED SIDE PLATE, P02, P03, CARDS AND, LOWER WIRE ROPE EYE DAI, TED CAPSULE SUPPORT PLATE, TED CAPSULE ALIGNMENT BRACKET.

SCALE 1/4" = 1'

VIEW B-B

TEC-ENGINEERING RUN
CARRIAGE SUPPORT CONCEPTUAL DESIGN
SCALE 1:8